

FAMILY THERMOMETRY;

A MANUAL

OF

THERMOMETRY,

FOR MOTHERS, NURSES, HOSPITALERS, Etc., AND ALL
WHO HAVE CHARGE OF THE SICK AND OF
THE YOUNG.

BY

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MANUAL
OF
THERMOMETRY

FOR MOTHERS, NURSES, AND ALL WHO HAVE CHARGE
OF THE YOUNG AND OF THE SICK.

"Je suis tout à fait de votre avis sur les services que la thermométrie humaine peut rendre dans les familles, dans les écoles et dans la société. Vos

indications sont excellentes, et c'est un point qu'on ne doit pas se laisser de prêcher afin de le faire pénétrer dans l'esprit public."

E. LITTRÉ (de l'Institut de France).

AMONG the indications considered as excellent by M. Littré was this: "Let us educate women in the arts secondary to ours, and particularly in the handling, recording, and intelligent reading of the medical thermometer Make them love, study, and trust the little instrument which—like the little finger of the fairy tale—tells things that nobody can know otherwise."—(*Human Temperature*, page 260. W. Wood, publisher, New York, 1871.) If a judge like M. Littré thinks these

ideas worth preaching, I feel encouraged to repeat them, first to mothers.

Taking mothers as types of the women who devote themselves to men from birth to death, and especially one who as fervently wished to have a child as she now wishes to know how to take care of it, I will explain to her, and through her to all, the handicraft of thermometry, a recent acquisition to the noblest of arts, that of rearing children, and of keeping up flickering life.

To Madam R. P. . . .

Do not imagine, Madam, that in so doing, I intend to impose upon you an enumeration of *all the ills our flesh is heir to*, with their corresponding antidotes. On the contrary, I would sooner invite you to forget the fearful names by which you have been taught to dread them, and to concentrate your attention upon the general appearances of diseases, which we call signs, and which truly—to those who have learned their meaning—signify imperilled life.

The most important functions furnish such signs. The circulation offers some which are excellent, but are with difficulty appreciated by inexperienced persons, by means of the touch at the wrist, or of the ear over the heart. The respiration, also, gives good warnings, though more of local than of general affections. But bodily temperature is the true and visible index, either of steady health, of sickly tendencies, of impending or actual sickness, of imminent danger, or of unavoidable dissolution. The other vital signs are precious, temperature alone is always indispensable.

By its aid, the first question for a mother is not, what is the name of the disease which has attacked the child? but in what proportion is life escaping or has already escaped by the feverish process of burning (ustion) as marked on the stem of the physiological thermometer? For all diseases—whatever be their seat or apparent diversity—have this in common, that *they are ustions, whose combustive process is marked by a rise of the thermometer during the period of invasion, and by a fall towards the period of exhaustion of a disease.* Hence all the diseases may be viewed by a mother or a nurse, who is deprived of the light of modern medicine, as exaggerated or diminished combustions (respectively hyperpyrexia, and apyrexia).

From this point of view, the appreciation of the temperature of the body takes the precedence of everything else in the art of taking care of children and patients generally. The instruments by which the temperatures of the sick may be ascertained, and their tendencies towards a better or worse condition may be favored or combated, are second to none among the means of nursing and education; and the manual of these instruments is likely to give the information most needed by mothers, nurses, sisters of mercy, teachers, and all those who have charge of children and of the sick. In this belief I will try to diffuse a clear understanding of the use of the family thermometers.

The first of our thermometers is our own hand, since we can use it when we have no other; and if it does not give, like the manufactured instruments, the mathematical degrees of temperature, yet, by intelligent modifications

of its modes of pressure, the hand alone can communicate a correct idea of the various depths at which the inflammation may be seated ; also of the moisture, dryness, tension, flabbiness, or elasticity of the parts, and of their other qualities which are beyond the reach of philosophical instruments.

The hand of woman is naturally better adapted to this purpose than that of a man. In the art of recognizing diseases (diagnosis), it would surpass that of men if it were developed by a proper cultivation ; but it receives none, except by actual blunting on the piano or the washboard, it makes little difference which. So that well-bred ladies there are, who handle a child with elaborately bedecked fingers as a spider does a fly ; and rustic women, who carry it in their clumsy hands as in a cradle of butter. So far, the natural possession or privation of a motherly sense has been the only guide of the hand in nursing. But as all the nurses are not mothers, and as there is an art in everything, even in love, I must explain how a loving hand becomes a knowing one in thermometry.

To attain to this sensitive capacity, the hand, like all instruments, must first be kept in working order. For instance, smooth on every surface, particularly at the extremity of the fingers ; clean, not only from vulgar impurities, but from fats and cosmetics, from the moisture of immediate washing, or from the products of insensible perspiration ; and warm to a degree approaching that of the surface to be felt.

These precautions are urged to prevent the transmission of contagious diseases, to respect the sickly sensibility of the skin of patients, or that of infants unused

to our atmosphere, and to the sudden contrast of heat and cold by contacts; and moreover, to preserve or bring back the uniformity of feelings of both exploring hands, by keeping them in the same external temperature previously to using them as thermometers; since, without the latter precaution, each hand would carry to the brain a different perception of the explored temperature, for the same reason which makes us feel a bowl of water warm or cold, according as we plunge in it, alternately, or even simultaneously, one hand previously warmed, and the other chilled. This experiment shows conclusively that our sensations of tact are correct and reliable in proportion to the care we take of keeping our hands at a mean temperature; which is easier to a stationary nurse than to a perambulating physician. Indeed, for the nurse, living in the same room with a patient, it could hardly be otherwise.

Conforming to the above working conditions, the manœuvres of the hand-thermometer are conducted in the following progression :

The flat of one or more fingers, or of the whole hand, according to the size and configuration of the surface to be explored, remains hovering a while above and near, to perceive the heat exhaled therefrom; then enters upon a slight contact with this surface, to receive the impression of its most superficial temperature; then by a firmer pressure receives the full impression of the skin's temperature; then by gradually deeper pressures, receives the impressions of deeper and deeper seated combustions. Every one of these pressures should be made separately, after the impression of the former has dis-

tinely reached the mind through the inquiring hand. Then the hand is gradually and slowly removed, in order to appreciate these different modifications of temperature in inverse progression.

For patients, the times to use the hand-thermometer are when they are particularly uneasy, after they have made an effort of some importance, when a crisis, like a chill or fit, is apprehended, and just before the usual hours of applying the fever-thermometer, say 1, 5, and 10 o'clock, A.M., and 1, 5, and 10, P.M.

The parts to be explored are, 1st, those affected by local disease, sudden pain or habitual weakness; 2d, the centres of the great functions or organs contained in one of the three cavities, the head, the chest, and the abdomen; 3d, the extremities, whose increased or diminished temperature gives timely warning of some disturbance in the circulation, etc.

For children, a mother will readily understand that the question of temperature takes the precedence over all others during their nursing, rearing, and education. For, hardly freed from the last pains of labor, and assured that the baby lives, she asks, "Is it warm?" That is the main question. Is it warm? Is it too warm? Is it warm enough? Is it equally warm all over? That is it. As soon as you become a mother, Madam, you know more with your newborn feelings than we with our books. I have only to show you how to make use of your heart's knowledge.

The time to explore the temperature of a child is always; but not always in the same manner, in the same degree, nor in the same regions. These tactile explora-

tions are particularly indicated in the early morning, when washing and dressing; about mid-day, after an outside exposure; at bed-time, and later in the night, taking care not to disturb the sleeper.

This routine survey comprises the parts to which are referable the most important functions. But when it is made under special apprehensions, it becomes more localized, thus : during the first months of breathing, towards the chest ; later, when teething, towards the head ; about the throat, in the evenings of damp, foggy days ; over the whole region called stomach in the nursery, when solid food begins to be greedily, and almost toothlessly swallowed ; later yet, as the child grows older, these explorations of the body's temperature must be directed towards the seat of their prevalent activity or appetites, or passions, as they occur in youth, or towards the weak or affected parts, in the delicate or the convalescent.

With a healthy child, the caressing hand is always involuntarily inquisitive of any possible sickly temperature ; while with a puny or invalid one, it is the inquiring hand which is caressing. But in case of confirmed sickness, the anxiety of the mind is communicated to the hand, which spends more nervous skill in investigating the temperature than in petting. Thus each mode of feeling transmits to a mother's hand as many modes of perceiving, whereby she masters a knowledge not to be acquired in schools. It is in the same manner, though to a less degree, that in the greeting hand of your physician you feel an inquiring, sometimes an anxious, always an affectionate pressure. But your hand, Madam, will soon acquire a skill which, enhanced by your affec-

tion for your child, will excel the doctor's, and become almost prophetic.

This motherly and medical education of the hand, for it is both, does not allow a disease to gain a long start over the treatment—when children need medication, it cannot come too soon—and enables us to distinguish discomfort from illness, thus saving not only a great deal of trouble and anxiety, but of unnecessary medical intervention: where nursing will do, prescribing is a fraud; though often imposed on the impostor, by the necessity of allaying the blind apprehensions of a family.

But women, by educating their hand to feel the temperature of their children, not only free themselves from ignorance and its low train of prejudices and fears; they also cultivate in themselves a sense, the tact, whose normal development is necessary to the attainment of two of the most elevated purposes of life: art and purity. For the elevation of the touch to the dignity of tact prepares the hand to execute the most chaste and artistic conceptions of the mind in drawing, cutting, and general ornamentation of self and home; as it extends and refines the delicacy and physiological sanctity of living contacts, and leaves no room for gross and haphazard desires in the beast once idealized to the very tip of her fingers.

Such are some of the direct and side-rewards of the education of the hand to feel motherly, tenderly, and intelligently. By this latter capacity—a gift of love, too seldom developed by culture—a mother, or devoted attendant, is made aware of any general or local disturbance of temperature; knows that there is peril, and takes her thermometer to measure it.

I say *her*, because in the thermometers yet generally used by physicians, the scale starts from the melting point of snow, or from the freezing point of mercury, points of no interest to a mother, since they are far remote from the range of health, disease, and death. Whereas, in the physiological thermometer, which is hers the more, since it was contrived for her, the

health-point, or *NORME*, is the pivot or centre of the column of mercury, in this wise :

In health, the index remains at this *norme*—which is marked zero—health ($0 = H$) on the instrument—with slight fractional oscillations characteristic of life itself.

In fever the index runs up.

In depression it runs down.

Proportionately to the danger, both ways.

That—and no ice-cream melting, nor sugar-plums freezing—is what the mother wants; a visible, though silent signal, whose alarum reads as plain as the shadow of a sundial.

As soon as a mother is informed by her tact, or by other signs, that something is the matter with her charge, she first makes sure that he is in a comfortable and safe position in regard to attitude, breathing, and wants of any sort; then she betakes herself to her thermometer.

Here it is.

She holds it in her hand, the reservoir (end or bulb full of mercury) down. The index must be two or three degrees below zero (to be thus written $\bar{2}-\bar{3}$), or brought to that point by gentle swings of the arm, or shakes of the hand; and



the reservoir is warmed in the other hand before inserting it.

It is not always applied to the same parts. In very young infants, it is introduced into the rectum, or inserted in the folds of the neck or of the groin; and later, in the axilla or armpit from behind, where they cannot so easily displace or break it. Later in life, it is rarely, but purposely, introduced in the natural cavities—the mouth, etc., and generally in the artificial cavity formed by the axilla in the following manœuvre:

The arm being raised horizontally, and the axilla dried, if moist from perspiration, the reservoir is inserted, not too deeply, just in the fold noticeable in the arch formed by the junction of the arm with the chest. Then the fore-arm is strongly flexed and held across the chest, so that the hand touches the opposite shoulder, during eight or ten minutes; or less, if it is evident that the index has ceased to ascend. If the patient cannot execute this manœuvre himself, it is done by an assistant. In ordinary conditions, the temperature is found half a degree higher in a natural than in an artificial cavity; a difference to be noted or compensated in the records of temperature. The degree thus and then reached by the index positively marks the (pathological) sickly temperature of the patient; the distance of that degree from zero being mathematically equal to the distance of his present condition from health, as shown in this

PLAN OF THE MOTHER'S THERMOMETER.

Degrees above 0.	7	No well-authenticated recovery.
(thus written)	6	Generally death.
	5	Often fatal.
	4	High fever.
	3	Considerable fever.
	2.5	Moderate fever.
	1.5	Slight fever.
	0	Standard of health, NORME.
Degrees below 0.	.5	Sub-normal.
(thus written)	1	Depression.
	2	Collapse.
	3 to 4	Algid collapse. [era.
	4 to 5	No known recov., except in chol-

If these generalities were the whole truth, this scale could be trusted without explanation. But here, as usual, the simplest rules are modified, when we pass from their abstract enunciation to their concrete application. So it is here, where the degrees of the thermometer will be found to have the absolute value above expressed, and also to borrow other relative values, not only from their position in a series of thermometric observations, but by their comparison with the signs of the pulse and of the respiration.

But before entering into these considerations, let me acknowledge that I do not expect to be further followed by the women who, distrusting themselves—probably without injustice—will call a physician as soon as they

have found that the temperature of some one of their family reaches three degrees above zero (thus written (3), or one degree and a half below it (1.5); and relinquish to him all responsibility, as soon as these alarms are in figures written. To those women, the thermometer has rendered all the service it can, in warning them of the precise point at which they cease to be adequate to the task of taking care of the patient; and that is right. Let every one go as far as her comprehension goes; do not ask a step more, it would be a mis-step.

But for those who feel able to help their physician by adding to their good nursing the recording of the movement of the temperature during his absence—a record which is so necessary to guide his future action—and for the other women who happen to be so situated as to be deprived of medical assistance, and still must take care of their sick; for these intelligent and resolute persons, like yourself, Madam, the following instructions are written.

After taking the temperature correctly, the next thing is to record it correctly. For one cannot make several thermometric observations without feeling that, to find out their correlative meanings, they must be computed and recorded with a strict accuracy.

This accuracy is obtained by an arrangement of charts, on which are noted the temperature, the pulse, and the respiration, morning and evening, or oftener.

This material process of nursing under the light of thermometry, is so important, that I put off the consideration of its results in order to show its mechanism. It is a kind of book-keeping of the three vital signs, temperature, pulse, and respiration, under the title of ...

The filling up of this chart demands some attention, but no more than can be expected from the average of mothers and nurses; and the explanation of its working, line after line, and summed up at the end of each week (septenary), will not take here more than ten minutes of attentive reading.

The first line is filled with the number or address, name, age, sex, and disease—if known—of the patient.

The second is filled with the normes—if previously established—of the temperature, which in infancy is generally found higher than zero, and is sometimes deviated either way in after years; and of the pulse-beats and breathings, whose individual deviations in health are more frequent, and considerably wider than those of the temperature. Three individual normes which must be the bases of judgment of those called to decide upon the gravity of a disease by the condition of the three great vital signs.

The third is filled with the calendar dates, from the commencement of the disease to its termination.

The fourth is filled with the days of the disease, beginning with the first and continuing to the last, after carefully noting the one at which the treatment began.

The fifth is headed with the letters M and E, under which will respectively be written the morning and evening observations.

The records of the general temperature taken with the instrument, and in the manner just described, occupy the five following lines, in the following order: Above zero all the temperatures marked as such by the index are written on the sixth line. The normal temperature, marked zero on the instrument on the seventh line, and

all the temperatures marked below zero by the index on the eighth line.

The daily average, which occupies the ninth line, is taken by adding all the temperatures taken in a day, and dividing the sum by their number; or better, by adding the maximum to the minimum of each day, and dividing by two. The product of either operation is considered to express the average, or mean temperature of a day.

The tenth line is given to the daily difference found between the highest and lowest temperatures of one day. This difference expresses in figures the daily course (*excursus*) of the fever.

In view of simplifying the chart, some details have been here omitted, which an intelligent mother may note on the margin; as the time the temperature begins to rise, the time it attains its daily maximum, the time it begins to fall, the time it attains its minimum, and the respective duration of both, maxima and minima.

For the same reason of economy of space on the chart, the record of local temperatures in local fevers (*phlegmasia*) occupies only one line, the eleventh; the pulse-beats counted morning and evening, or oftener, occupy the twelfth line; and the breathings, counted at the same time, the thirteenth.

When these records have been kept during seven days, they are summed up in the weekly form which I have called, after the ancients, *septenary*.

A medical *septenary* records the totality of the symptoms during seven days, beginning with the first of the disease.

This division in weekly periods has for it the authority of the highest reliable antiquity, and of the most recent painstaking observers. Truly it does not conform to the facts—or the facts do not conform to it—in simple indisposition; nor in the ephemeral fevers, whose duration is of one, three, or four days; nor to those unclassified affections which seem nipped by an early and active management, no more than to the protracted (*sempervirent*) affections which set at defiance the natural divisions of time in nights and days, weeks, months, etc. But if we consider that, under the necessity of grouping facts for the sake of method in our studies, one must stop somewhere it will be found that the selection of the antique and scientific group of seven, as a base for medical observation, is judicious and justifiable. It looks the more so in a practical point of view, since its components, three and four, are the numerical casts of most of the ephemeral affections, in which the reckoning of symptoms may be limited to their ternary or quaternary group, without absolutely breaking with the ancient and generally correct tradition of septenaries.

These weekly sums are written at the end of each line of the chart. These few lines contain, compressed into a chart of the size of a small hand, what is the most important for a woman to know in regard to the dangers that may menace her circle.

I have just shown her how to fill up these lines day by day, and week by week; I must now show how to read and comprehend them.

Beginning with the date of the commencement of a disease, which is the first question of a physician; very

seldom has a mother noticed it. She, in her turn, asks the governess, or the nurse, who thinks that may be no ah, yes sure she cannot tell. Whereas a thermometer would have shown the mother what day the temperature of her child began to deviate from the norme; and how much it did deviate in the morning and in the evening, every day, or every alternate day, etc. These points settled, the doctor could instantly understand what has been—or at least what cannot be the matter; and he would not be uncertain as to what to do—and particularly what not to do.

But where shall we find a mother who has been taught her duty in that matter of life and death? No use to mince it; it is a shame and a scandal that in the curriculum of education devised for our sisters and wives, there is room for algebra, trigonometry, etc., and none for the fine art of nursing; that they are taught to look through microscopes and telescopes, but not in the face of the little ones to read therein health or sickness; that they can tell the latitude of Pekin, the height of Chimborazo; know at what point potassium fuses, or mercury solidifies, but that not one ever heard at what point of elevation of the latter metal in a thermometer life escapes from their dearest. Silence, my reason! . . . for the very one to whom these counsels are dedicated, stored in her mind Greek, Latin, and what not . . . and had her precious freight before she knew how to keep it alive. But in her, the humanities had not obliterated humanity; and, mother, she now learns the A B C of motherhood.

This is just the name I would more especially give to that part of nursing which mainly consists in spying the

subtle and bold invasion of disease, and of measuring, from the first, its deadly strides into the vitals of the innocent. The mother who can do that, is the sentry. When she detects the moment of the invasion of the cradle, and measures the strength of the enemy on the stem of her thermometer, and can transfer and read its warnings on her chart, she is prepared for the struggle with death itself.

The supreme importance of this first observation of the first abnormal temperature, at the first moment of a sickness, cannot be over-rated. If it rarely shows, by name, what the intruding illness will be ; at least, it can often, by exclusion, tell what it will not be. For instance, a high first temperature, as of three to four degrees above the point of health (3 4), cannot herald typhoid fever, but can measles or scarlatina. Moreover, this first observation serves as a milepost to start the reckoning of the future stages, of increase or effervescence, of full force or fastigium, of diminution or defervescence, of convalescence, relapses, etc. Error on that day carries with it error in all subsequent computations and expectations ; and I repeat, if the mother is not capable of taking this first temperature, nobody will ; since it is generally altered before the nearest physician can be obtained.

But now a single observation of temperature needs to be confirmed, interpreted or corrected by others, as I have previously hinted. The time at which it was taken in the day, or in the course of the disease, modifies its meaning. For instance, a single observation in which the index marks zero does not necessarily mean health, since it may have been taken when the temperature was in transit from high effervescence to deadly collapse, or

simply during a (remission) relaxation of the fever. Likewise, the index found but once very high, or very low, does not necessarily mean a fatal issue, since it may have been brought to one of these extremities of the scale by some nervous excitement, or by a depression, often as harmless and transitory as the one which precedes or accompanies vomiting. In such cases, subsequent observations are necessary to modify the judgment founded upon the first.

For this, and other reasons, thermometric observations need to be repeated; more correctly speaking, to be serial: a series of them having a surer and broader meaning than any one of them taken separately.

In ordinary cases, a serial observation of the sickly *fluctuations* is taken at the very hour at which the regular *undulations* are expected in health. From 8 to 10 A.M., and from 4 to 6 P.M. In grave cases from 1 to 2, 3 to 4, 7 to 8, 9 to 10 A.M., and from 12 to 1, 3 to 4, 6 to 7, and 10 to 11 P.M. But if the fever assumes no type, is (ambulant) moving about, instead of showing rhythm, the thermometric observation must be continuous, till you have, if possible, detected the salient point of its mobility, and mayhap the law, or rhythm of its apparent lawlessness.

However, whatever may be the diversity, or the apparent absence of rhythm of sickly temperatures, the mathematical law upon which family thermometry is founded applies to all, and remains unshaken. It is well condensed in this proposition: The distance which separates a patient from health is proportioned to the sum of the degrees which separate the index from zero, and the time that the deviations from the norme have lasted.

Now it will be the object of the following reading of

the chart, line by line, to demonstrate the adaptation of this law to the various relations of sickly temperatures with the norme, and to each other.

All sickly temperatures are judged by one standard, the norme.

The general norme of the Caucasian race is 98.6° Fahrenheit, equal to 29.6° Reaumur, to 37° centigrade, and to 0 of the physiological scale of human thermometry.

There are, moreover, exceptional normes for rare individuals, and temporary ones experienced in protracted convalescences, and during a passage from temperate to torrid zones, and *vice versa*; and finally, children's normes, more cognate to our subject, and of which soon.

On a clinical chart, the first thing which strikes the reader, after the excess of the sickly temperature, is the impossibility of settling it at zero. It may pass through it in transits from exacerbation to remission, but never remains about it till convalescence is confirmed, and health proof against relapses. So that, if during a succession of three mornings you read zero or a few tenths of a degree more or less, and if in the ensuing afternoons till bed-time, the rise does not exceed the half of a degree ($\underline{.5}$), you can pronounce all danger over, the patient cured, and kept only under the restraint of hygienic and recuperative measures.

Here is the place for the records of the daily averages of temperature of which I have just said a word. This is a (hypothesis) supposition of the mind, by which we regard as motionless in theory temperatures, which are never without movement in fact. This operation has for its object to compute and compare the daily waste of vital forces by a sickly ustion. The study of these

averages enables us to calculate how many more degrees of heat your patient lost to-day than yesterday, this week than the last, etc.; the daily average loss telling mainly how much support is needed; and the weekly average where the crisis tends.

Properly speaking, the study of the temperature of the man-body is nothing else than that of the various aspects under which its fluctuations may be viewed. And from the view taken of these fluctuations, will be derived our views upon the treatment and nursing.

Sickly ustions are ever changing, being fanned by the vibrations, or rhythm, of various fevers, in various organisms, varying also at the different stages of the combus-tive process. In this respect, a physiological conflagra-tion of the human frame presents very much the same appearance as a physical one; whose course through the building's frame is marked by the alternate rise and fall of the flames, in the manner of exacerbations and remis-sions. For the inexperienced eye, during the exacerba-tion everything seems to be lost, and during the remission everything seems safe again; but not a whit of either for the experienced mind, to whom this double, or oscil-latory movement appears as the ebb and flow of the vital tide, swollen or depressed by the rhythmic action of the fever.

Thus viewed, every temperature above the average of the preceding day—as previously established—is con-sidered as an exacerbation, and will have to be nursed as such by cooling means and temperatures.

Every temperature below the same average of the pre-ceding day is considered as a remission, and has to be taken advantage of as such for supporting, warming, etc.

Note the time at which both exacerbation and remission began; for an exacerbation beginning every day earlier is a bad sign, and one which begins every day later promises well. But for the remission, the reverse calculation obtains; the earlier begun the better, the later the worse.

Note, too, their respective durations. A long exacerbation is bad, a short one good; a long remission is good, a short one bad.

Now for what can be learned from the greatest height (maximum) of the exacerbation, and from the greatest depth (minimum) of the remission. Of course, the highest point daily attained by the index indicates one, the lowest the other.

If the maxima grow higher daily, and their sum weekly, and the minima grow deeper, separately or simultaneously, the danger is on the increase; if either comes gradually nearer the norme, the other one not receding from it at the same time, the chances are improving; and if both maxima and minima gradually approach that point—0 on the physiological thermometer—the cure is nigh.

The temperature of twenty-four hours may remain most of the time in the neighborhood of the maximum, or of the minimum, either being a good or a bad sign, according as to which of these extremes is nearest or farthest from the norme.

The range (excursus) of the temperature between the maximum and the minimum is called the daily difference. A great difference is absolutely dangerous, but a small one may be relatively as bad if the field of its excursus is limited to one single degree or about, far above

or far below the norme; the nearer the excursus moves from the norme and the shorter the daily difference, the safer is the case.

These are the principal mathematical indications offered by the absolute and relative positions of the maxima and minima of temperature, and by the distance (excursus) which separate the latter every day and during septenaries.

These simple, but forcible calculations offer such sure guidance in the motherly nursing of the sick, that I feel it a duty, after having presented them in the abstract, to substantiate them in a few figures; so that it will be impossible to read and not understand.

A very high maximum, say five degrees above zero ($\underline{5}$), is very dangerous of itself; but it is more dangerous yet if this maximum is the latest in a progressive series of maxima which have every day grown higher by half a degree or so, and come daily earlier by one hour or so.

The danger of the same (hyperpyrexia) high febrile heat is increased, if the remission which follows it descends, say two degrees below the norme ($\underline{2}$); the excursus being then seven degrees (7), reaction is rendered almost impossible, and collapse and death will follow, unless the most energetic means of restoration are instantly applied.

But if the same high maximum ($\underline{5}$) is followed by a remission whose minimum does not descend lower than, say four-tenths of a degree above zero ($\underline{.4}$), the excursus being only four degrees and six-tenths (4.6), leaves more hope of a natural reaction, and more time to support the patient, and to avert a fatal temperature.

A very small difference, say of one degree, is an omi-

nous sign when resulting from a daily excursus taking place in the upper regions of (pyrexia) combustion, say at four, five or six degrees above the norme ($\underline{4} - \underline{5} - \underline{6}$); or in the lower regions of (apyrexia) exhausted or prevented combustion, say two or three degrees below zero ($\underline{2} - \underline{3}$); whereas the same difference of one degree in the region of the norme, say from five-tenths below zero in the morning ($\underline{.5}$) to five-tenths above zero in the evening ($\underline{.5}$), would announce a recovery, or eventually denounce a simulation of disease.

Do you not see, Madam, without further explanations, that to thus write, read, and interpret the temperature of your patient, requires less attention and discrimination between contending elements than the successful planning of a nice dinner, or of a winning toilet?

By this method of arrangement and interpretation of temperatures, you have constantly in sight on a few lines, the actual distance, and the kind of relative distance, which separate your patient from health; in other terms, the balance of his active and passive elements of ution, or of his vitality.

But when the same records are continued during several weeks, and their figures added up every seven days (septenaries), and the product divided by seven, fourteen, or whatever may have been the number of the thermometric observations during the septenary; then the comparison of the progression of these weekly sums with the progression of the daily averages, not only gives a mathematical direction to the means of treatment, but strikes by its positivism, as must have struck by their fatality, the oracles of Medical Theurgism, when Jehovah or Apollo was the doctor, predicting through

experienced and crafty priests, Levites or Asclepiades.

In certain cases the temperature needs to be studied in one more aspect. It is when the localization of the disease is rendered certain by a greater local ustion. Then it would be courting error to ask from the general fever thermometer a record of local temperature which it cannot give because it is out of its reach. The fact is, in (phlegmasia) local fevers, we need a local measurer of heat, besides the general one; the former should give the degrees of the local ustion, the other should show by how many degrees the local fever communicates itself from day to day to the whole body, through the general circulation; a positive calculation of great practical value, which was impossible as long as we had no other instrument to observe the temperature than the ordinary fever thermometer. To effect this calculation, and to meet many other wants, the fever thermometer has been modified in its shape, so that it could receive the impression of the bodily temperature, not in a cavity, but on any open surface; not from the whole length, but from the bottom of the reservoir, enlarged to that effect. It is simply a



SURFACE-THERMOMETER.

Its scale is the same as the other's. It is not made self-registering, because one often needs to see the quickness of the rise of the mercury, in order to form an idea of the activity of the inflammatory local process.

It is managed thus: first delicately applied, not pressed, upon the skin at the point to be observed. Two fingers hold it above, not upon the column of mercury (for fear of increasing the heat), as long as the metal rises.

Then the result is read and registered, and the instrument, cooled a few degrees, is re-applied to another part, whose temperature in health is known to be like (isothermal to) that of the now sick one. Proceeding here with the instrument as above, one reads and registers the result, which subtracted from the result of the former operation, leaves a difference, which expresses the degrees of fever of the inflamed spot.

The same operation takes less time when it is simultaneously performed on the two select points with a pair of surface-thermometers well-matched to work together: both procedures are optional.

It is out of my plan to enumerate the local affections in which the surface thermometer finds its usefulness; but it is in my plan to show the general bearing of its indications.

These indications, compared among themselves from day to day, will show a mother that local affections are, like the more general ones, susceptible of periods of effervescence or increase, and present an acme or summit, followed by a decrease or defervescence. From this observation, the mother will learn not to fidget over little, though painful inflammations, boils, earaches, etc., but to soothe them, according to their stage during their evolution; not to distrust her physician because he does not interfere with the natural process of cure; and if in her impatience she has called another one, not to over-

rate the latter, whose advantage consisted in coming at the beginning of the defervescence.

Her surface-thermometer will soon tell her that, and more. For instance, she will soon find out the times of the exacerbations and remissions of local inflammations, whose hours and numbers in the day may differ from those of general fevers; observations which offer her the precious opportunities of allaying the coming exacerbations, and of taking advantage of the remissions to induce sleep, to introduce food, etc.

But I think I have insisted long enough on the power of thermometry to clearly trace the march of diseases, and to permit to predict their natural issues.

Now, let me show what virtual power there is in thermometry to direct, avert, or postpone these issues.

I promise you, Madam, not to launch you in the practice of physic; but I feel the responsibility which would weigh upon me for keeping you in that state of passive observation before the sick, which has, long ago, been characterized as a meditation upon death.

Between the two extremes of disheartening reading of sealed fates, and of interference in ills unknown with drugs whose virtues are as mysterious to you as those of Roman or Indian amulets, I mean to lead you—who bear the charge and the responsibility—toward a rational fulfilment of your duty, by showing you how to use the thermometer to favor the resolution of inflammation, and to re-establish the normal action through the whole organism.

So far, your instrument has been used as a measurer of life (biometer), to calculate in degrees the fatal action of extreme temperatures on vitality. Henceforth you

will use it to measure the wants of the patient and the curative (therapeutic) action of external temperatures, in restoring the normal bodily temperature. Do not be afraid of the difficulty of the task; it needs a little more judgment than dosing drugs; but you will find it much more satisfactory to your mind and feelings.

There is a protean power, yet unnamed by any acceptable name, which will be your ally in this task. This power realizes, between the patient and the circumstances you surround him with, an interchange of elements in which, from being physical in the surroundings, they become physiological in him, or conversely. The forces at work in this interchange, light, darkness, seclusion, exposures, frictions, movements, gases, vapors, moisture, etc.,—all convertible into heat, or in the means of applying and dosing heat,—act on the sick as on the well, only by different processes, with different degrees of resistance to, or of avidity for the tissues. The old channels of absorption and of evacuation may be obliterated, and new ones opened; what was food may become poison, what once was deleterious become supporting; the old rules of assimilation, and of equal repartition of the body's food (*pabulum vitæ*), are set at naught. To comprehend this new dynamics, inaugurated by the perversion of the normal temperature, the most learned does not know enough, and must be guided in the management of the sick, like you, Madam, by the light of thermometry.

Let us have it.

Thermometry indicates the want of the patient.

The mathematics of a disease contains the *Positive Philosophy* of its treatment.

Heat is life, at least its most integral expression.

Life is secure when the production and the consumption of heat are balanced. This equilibrium-point of health is marked zero on the mother-thermometer.

Life is insecure in proportion to the disturbance of the balance between the generation and the emission of heat. This disturbance of equilibrium means sickness, and is marked by the index of the thermometer at a degree mathematically equivalent to the distance which separates the patient from health.

It is this equivalence which renders sensible and appreciable in figures the mathematics of disease.

This equivalence renders also demonstrable in figures the action of the treatment; to bring the temperature of a patient nearer zero, is to improve him by so much; to re-establish the balance of the temperature at zero is to cure; the mathematical dosage of external temperature to that end is *Positive Medication*.

So has the treatment also its mathematics.

So, if you have carefully measured the bodily temperature, and studied its progression or retrogression through the daily exacerbations and remissions, you are enabled to counteract them by opposing to them proportionately contrasting external temperatures, or means of support.

Here the mathematics of the disease dictates the mathematics of the treatment.

This home treatment—precious when you cannot obtain the medical one—may be expressed in a few propositions: at least I will try.

Favor or moderate the ustion.

Supply the elements of combustion, as your thermometer shows their actual or imminent wasting.

Allay consuming heat.

Recall, and if necessary, accumulate departing heat.

Quench the thirst, even of him who cannot drink; and feed, through whatever channel, him who has no stomach.

Keep in readiness the materials of direct nutrition, later wanted, and of more difficult assimilation.

Present both—medical temperatures and restoratives—preceded by appetizing imaginations, under the most acceptable forms, and at the most appropriate moment.

As a healthy temperature has become insensibly or suddenly unhealthy; in the same ratio, the means of keeping up good-health must be converted into those of correcting ill-health. For the husbanding of that progression, you must be guided by the index of your thermometer; in which you will also find written the mathematics of the treatment.

Do not forget; you are only a mother, a nurse, an ignorant of what is called science. You have only one guide, your thermometer, follow it; attend to what you perceive, and aim at what you comprehend; do not ask more from yourself unaided.

Considering this home treatment—of which you have just read the generalities—as the (ensemble) entire sum of the modes of action on a diseased body, measurable by thermometry, it is composed of the simplest means of raising a falling or fallen temperature; of lowering another too high, or in process of ascension far above the norme; of equalizing the temperatures when they are different at the centre and at the extremities; of supporting life by the agents of calorification (pyrogenesis), when those of direct nutrition are not accept-

able; of feeding through other organs when those of digestion are not serviceable; of harmonizing the three great vital functions, the temperature, the pulse, and the respiration, as nearly as possible to their respective points of health or norme; of keeping the main functions at such a point of automatic activity—be it ever so small and artificial—as to insure their timely resumption as soon as the danger shall have abated, etc.

For a mother, the art of healing consists in the judicious selection of the means of carrying out these indications.

These means, at command in the nursery, to restore, with a normal temperature, health and even life, are as few in kind as they are varied in application; Nature furnishes them, a tender and reflective imagination multiplies their combinations when wanted.

To restore the sick body to its normal temperature—marked zero on your thermometer—the most effective, though not the only means, is the counteraction of external temperature.

External temperature, as a remedy, can now be dosed like any other, and its action on the body's temperature can be mathematically calculated, even predicted with more accuracy than the action of any pharmaceutic preparation. It is applied through some agencies, such as water and other liquids, air, light, gases, vapors; or created by muscular contractions, frictions, vibrations, and other communicated movements, sensorial excitement, tension of the will, etc.; or it is transmitted through poultices, topics, stupes, ice-bladders, and hot sand-bags, single metals in which cold or heat have been accumulated to a mathematical degree, or coupled

metals or other substances, whose contact is susceptible of communicating or of subtracting heat in definite proportions.

The action of external temperature on the temperature of the body, offers the most beautiful illustrations of the transformation of one force into another, or to speak more correctly, of the radical identity of forces.

If you try, for instance, as has been done for cholera patients, to accumulate physical heat in two bodies equally dead in appearance; in one, the heat will accumulate in a radius and at a depth proportionate to its intensity, but no farther, and gradually die away when the heat-bearing agent is removed, as it would in any inorganic body; this man is a corpse. In the other subject, the heat will not rise so high in the region directly heated, but will soon radiate and be felt at the extremities, besides affording other signs of returning circulation. In the former body the heat remained a physical force, unable to continue itself; in the latter, it was converted into a physiological force, and thereby became capable of propagating, feeding and continuing itself. Without this additional heat, life, already potentially extinct, would soon have been really destroyed.

Another fact brought in relief by thermotherapy—a word which does not mean an exclusive system, but simply the use of high or low temperatures as remedies—is that while a purely physical heat naturally cools as soon as it is no more (alimented) supported from without; on the contrary, when external temperatures have been used as remedies to raise, or to lower, the temperature of the sick, their effect continues to increase for a long time after the agent has been removed.

For example: Dr. Wilson Fox found that the process of cooling in a cold bath continues, and generally doubles itself during the hours following the bath. Contrarily, and in virtue of the same law of continuity of action of the physical forces when they have been converted into physiological, I have invariably experienced that collapse temperatures, two degrees below the norme ($\bar{2}$), for instance, having been raised, by the application at the pit of the stomach of the head of a hammer heated in boiling water (100° centigrade), will continue to rise during the hours following its removal, from three degrees, immediately attained by its application, to five above zero ($\underline{3-5}$). Therein is a good lesson. When a mother applies the means of warming or cooling her patient, she must desist from their use as soon as she has obtained the half of the desired effect, trusting for the rest to the aforesaid rule of action of external upon bodily temperatures.

Even if it were possible to describe all the combinations of means effective in modifying sickly temperatures by external temperatures, I doubt if it would be desirable. Not only these combinations ought to be inspired by the necessities of each case and the facilities of the nursery; but their categoric enumeration would take out from nursing all the art, and reduce it to a routine, not unlike the practice of some physicians who prescribe for a disease, not for an individual patient. Yet, to the preceding examples I will add a few others, to give a more extensive idea of the range of the application of temperatures as remedies.

There is an incredible amount of suffering, and sometimes of danger, in the unequal distribution of heat

throughout the body, caused by the ebullition* of the blood in the trunk, and its retirement from the extremities. This ought to be remedied as soon as detected, even without waiting for a physician. It is done most effectively by putting the hands and feet in basins of very warm water, and by keeping the body higher and cooler, by frigid irrigations, compresses, injections, ice-bags, and bladders, and the like, wherever the thermometer indicates their need. The surface-thermometer, alternately applied to the centres and extremities, will indicate when the process of equalization is so far advanced as to have acquired the power of continuing itself in virtue of the law just given. But that instrument must be re-applied often, to see that there is no mistake in the amount of the action and reaction of both temperatures. This test is an essential part of the mathematics of the treatment by temperatures.

There may be even greater danger in the opposite condition. The blood accumulates at the extremities, where its excess is evident from the heat, puffiness and blueness of the forehead, lips, face, hands, and feet; at the same time that the body is pale, flaccid, without self-support, and the circulation and respiration slow or hardly perceptible. Here, position, almost alone, may suffice to re-establish the evenness of the circulation and of the temperature; and that curative position consists in keeping the body low and warm, and the extremities

* A word of Sydenham's, worth preserving; though the opposite state having been named by Wunderlich *deferescence*, I have called the ebullition *effervescence* for the sake of uniformity in the language.—(See New York *Medical Record*, Jan., 1867.)

elevated, exposed to the fresh air, besides smartly rubbed, etc.

For the cure of local affections in children, external temperatures applied under one form or another, are equally energetic and successful. The stomach-ache of young infants is allayed, if the spot is cold, by warm fomentations; if hot, by cold compresses, and cold, even iced water-sprays. To measure these actions, the surface-thermometer is the necessary adjuvant of the hand.

It is necessary to remark that the kettle has cured more cases of croup and diphtheria than medicines! Not that I want to discourage the use of the latter; but the formation of membranes is so rapid, the physician and druggist are often so slow, and the kettle is so soon steaming in the nursery, that you will do well to trust the steam first, till you can obtain more scientific helpers; moist, warm, and timely inhalations being almost specific.

In local nervous affections of children impairing their sensibility, activity, or nutrition, the mother learns soon the value of the rubefacients of old, such as Spanish and potato flies, mustard, ginger, and the different species of pepper in various warming forms. She can also rely upon the alternate use of cold and warm applications, by which the vital functions are rendered more active; and most particularly upon the local application of alternate layers of woollen and cotton cloth, respectively moistened in weak dilutions of alkali and acid: a special warming process, by which nutrition is favorably modified.

The introduction of medical temperatures through the stomach demands a little explanation. That is the way most of the fuel enters in health, and in sickness also,

save by the exceptional methods of hypodermic and other injections, by which, what the stomach cannot receive or retain, is intrusted to less sensitive or less capricious organs.

The coolers through the stomach are ice, the type of all others, pure water, if (potable) fit to drink, light effervescent waters, and emulsions of what the ancients called the cold seeds (pumpkins, cucumbers, melons, and water-melons), the juice of the two latter, and of the orange, lime, lemon, grenade, and of some small fruits of our climate, diluted, or not, with good water at different temperatures.

The substances which bring heat to the stomach are more numerous than those which afford it coolness. They are selected to correspond to the necessities of each case, and to the opportunities of the morning or evening crises; upon the experimental indications of thermometry on the digestion, for their known or reputed properties, and also in reference to the taste of the patient; a taste which is not an indifferent matter. The same remark obtains when true food begins to be needed.

These heaters are hot drinks and porridges, and what a patient can take of ordinary food, the vegetable bitters and their extracts, the aromatics and spices already advised externally, and in which the heats of the tropics are concentrated like ideas in a symbol; the warm juice of the grapes of milder latitudes, coffee, alcohol, and (one alkaloid) quinine.

It may be said that I trespass on my plan in recommending the use of these two medicines. But where a physician cannot be obtained, and the patient suffers from a very high or very low temperature, cracked

tongue, etc., I consider it a mere question of humanity to advise the woman in charge to give, every two or three hours, a tablespoonful of whiskey and one or two grains of quinine, till the symptoms mend, or professional assistance comes.

Coffee, strong and black, or mixed with thick cream, will arouse the nervous activity, and generally support, through the nervous apparels; it acts better in the early than in the latter part of the day. Whiskey, too, will support, but through the respiratory organs, and acts more appropriately later than earlier in the day, and during the cooling hours of the night. It will also be noticed that alcohol and quinine are recommended to modify the two extremes of temperature: let me hazard, of this fact, an explanation, both experimental and theoretical.

When one enters an humble cottage in middle sunny Europe, he is greeted, if in winter, by "Take a glass of wine, it will warm you." If in summer: "Take a glass of wine, it will cool you." Was this a sarcasm?—it would season with bland wit true hospitality.—But no; experience taught these simple peasants, that both extremes of temperature are brought to, or nearer the health point, by bitters and alcohol: they do not know that these two extremes and contrasts represent the same physiological fact, a fast departing, or an already consumed vitality, which equally require a quick and abundant supply of fuel; but their open heart has divined the most paradoxical mystery of the regulation of the two extremes of human temperature by the same means.

Mothers, by transferring this paradox in their nursing,

will, with some ounces of alcohol, or a few grains of quinine, lower or elevate by several degrees sickly temperatures, and accelerate or slow an anormal pulse by many beats; whereas, in health, they could hardly modify these functions with larger doses.

The other means of restoring the sick body to its normal temperature are mainly by feeding.

In the beginning of a disease, the nutritious part of feeding may, or must be dispensed with, as it is not desired, and may produce nausea, vomiting, colics, etc. But then the external use of water must be the more frequent, and heating or cooling drinks—as thermometry will indicate—must take the place of nutritious food, in view of putting down or of feeding the ustion.

The earlier in a disease, the easier fasting is borne; manhood stands it longer than youth and senility. Conversely, the later in a disease, and the younger or older a patient, the more urgent it is to feed; since every day of high combustion and of fasting increases the danger attending the unavoidable period of cooling (defervescence), or even of collapse.

This apparent contradiction between the want of nutrition and the incapacity of assimilation is obviated in several ways. By feeding at first with the most readily assimilable substances; by strengthening the food with warming and diffusible condiments; by elevating the temperature of the food and drink; by warming the organs of digestion from without; by introducing food through other organs than those of digestion; by watching the first demands of the exhausted body for support; by hastening the craving contractions of the stomach for something to eat by bitters, acids, or tonics—among

others by minute doses of quinine, before each intended meal,—by the unexpected sight of other people enjoying dishes once favorite with the patient; by appetizing the imagination, and reflectively the taste and stomach, with graphic view or description of the good things once liked, and presently attainable.

Let us now meet the same difficulty—of resuming the functions of digestion—from another stand-point than the disease itself.

When you try to feed a patient through the natural ways, you encounter other difficulties besides the revolt of the stomach against a burden. The fever-heat has parched the inner coats (mucous membrane), and practically paralyzed its mill-hopper's (peristaltic) movement, whose object is to carry the supplies downwards. The dryness causes not only an incapacity, but a reluctance to take food or drink, and the effect, becoming in its turn a cause, increases the inflammation by the sequels of starvation; and a fatal end is hastened, if not brought on directly, by the want of a constant and affectionate moistening. The frequent moistening of the mucous membranes of the nose, in fevers, is commanded for similar reasons.

And more, since the sick have not so much appetency for bread and flesh as for delicate provisions, some more impalpable than gas or sun rays; a smile, a dear contact impressed on a face already rigid, are known to have been reproduced by an almost unconscious automatism, and to have unlocked the lips and jaws which could not, otherwise, have received the saving drop. A mother, a woman, sooner than a man and physician, is master of arts of this pharmacopœia, whose doses are stronger in proportion to their ideality.

For the nurses who do not care to take their degree in that art, it will be sufficient to observe on the mouth of their patients of any age, a peculiar movement of dry swallowing, which means thirst, and speechlessly begs for a drink.

One of the means of keeping the digestive capacity in readiness for the moment it can turn the scale of life, is to give, during the whole disease, a little more of food or drink, at the hours which used to be those of the regular meals, than in the intervals. This mock-meal has for effect to keep going the automatism of the stomach. This function, once stopped, cannot always be easily set in motion again; and its immobility leaves the patient to die, not from this or that disease, but from starvation; after having lived as long as he could by eating his own substance (egophagism): of all the ends of man—be it remembered—the most frequent and melancholy.

But resources may be evoked from the depth of hopelessness. When all the functions are at the lowest ebb, the more the stomach shuts itself against the introduction of food in any shape, the more the skin becomes permeable and thirsty-like. Then the apparatus of exhalation becomes endowed with absorbent properties. Whatever may be the theory of this fact, experience has shown me an abandoned agonisant patient, who had ceased to imbibe a few drops of water, yet was soon rendered capable of swallowing light drinks and food, and eventually recovered, by having his abdomen and axillas thickly anointed with cod-liver oil. In this case, and in others less striking, the oil disappeared spoonful after spoonful, till the natural appetite had returned; but not afterward; a difference which upsets the older theory

which explained the disappearance of the oil by evaporation. But evidently it disappeared because it was absorbed, and its absorption gave warmth and strength enough to the patient to begin to digest through the natural channels.

This thirst of the surface of our body, and its increase during sickness, were well known and taken advantage of by the ancients, who believed in the skin as an organ of absorption, and by the chiefs of the Renaissance Medicale, who trusted it far more than we do to carry inward food, medicines, and mainly temperatures. In this respect, mothers will do well to consider the skin of their children, not merely as fair or dark, smooth or subject to loathsome diseases, but as a marvellous organism through which—by several millions of glands and papillæ—the inner self is in constant communion with the world. In sickness, try to keep the skin alive and fed, mother, and what goes by the name of mind will not be obliterated so early; and what goes by the name of soul will not so soon be driven away by starvation.

In all your efforts at feeding—feeding the fever with the elements of combustion, or feeding the body with the elements of reparation of the wasted tissues—remember your thermometer. It would hardly mark the impression made by a meal on a healthy adult; but on an infant struggling for life, or on the sick or convalescent whom you endeavor to keep alive, the index will come nearer the norme, that is to say, show more strength after each beneficent meal: by this sign you will recognize, in each case, the nutritious value of each substance.

If there is no rise of the index, there was no nourish-

ment in or from the food; if there is a sudden or high rise (above one degree), the food was too strong or too bulky. To be beneficial to the convalescent, the rise of temperature consequent upon the taking of food must be sensible, but moderate; say, from a quarter to a half of a degree (.25-.5); it must almost subside when the digestion is over, though leaving a decided improvement in the daily average of temperature; that is the test of true medical feeding under the control of thermometry.

Up to this point, I have endeavored to show how thermometry can measure the gravity of diseases, their march and tendencies; can guide in their treatment, can dose external temperature as a multiform remedy, and can reduce to figures the quantity and the quality of heat and food to be taken as medicines.

In doing this, I have carried my advice as far as an educated mother can go unaided by a physician, and I earnestly advise her not to extend her sphere of action beyond the circle I have traced as the natural limits of the home treatment. If she has done all that I have recommended, stood the storm of the disease in the patient and the frantic advice of the neighbors, and trusted her thermometer as the mariner does his compass, she will soon receive her reward. If her patient is not cured—which would, of course, be her sweetest recompense—no sooner has the physician read her observations, and confirmed them by his own, than he can prescribe a medical treatment which will not be counteracted by a previous dosing. Her task becomes subordinate, but not inferior to his; and sure that she now is well guided as a nurse, I feel free to pursue and conclude the generalities of my subject.

I had hardly begun to tell how the nursing and rearing of children are regulated upon the indications furnished by the thermometer, when I drifted into the thermometrical management of the sick. Mothers who have taken care of their own children will understand this : it is but an apparent change of subject ; since nursing the sick is one of the earliest episodes of their complicated office.

Now that the working of the fever and surface thermometers is so thoroughly explained that they may be applied in the nursery to measure the distance which separates ill from good health, and help to diminish that distance, let us proceed toward our most important object—the prevention of infantile and constitutional affections by the premonition of thermometry, and their modification or cure by the dosing of external temperatures as remedies.

It is but too true that many diseases and constitutional affections—as well as moral vices—are inherited. This possible, not necessary transmission is the dread of many. Women in particular wish for no family, sooner than to see it stamped with an hereditary stain ; or, seeing their children, living hopes, afflicted with some kind of degeneracy, as Niobe saw hers stricken by the vengeance of Diana, bear it in despondency, as an infliction of celestial origin. This semi-religious, semi-scientific teaching lessens the spirit of improvement of her race, which nature has imparted even to the female of the lowest orders of animals ; an instinct which constitutes their most incontestable superiority over their mates.

But mankind knows already better than fate.

Leaving the stigma of the original sin to be washed

away, or not, by the most ancient of hydrotherapies, let us prove, by facts, the doctrine of the *Infallibility of Blood Inheritance* false, wicked, and demoralizing.

In families most thoroughly tainted with hereditary affections, children are born perfect; on the other hand, from families without stain, children may be born, masses of corruption and pictures of all sorts of degeneracy.

Cretinism, which is so eminently hereditary that its laws of heredity are written, has sensibly diminished in the Valais, Switzerland, since roads have been opened, natural selections enlarged, and more hygienic habits generally introduced.

Speaking of cretins, the ruling families of Europe, which began by men of some sort of eminence, dwindled to low representatives of their hereditary peculiarities, or to actual cretins; some of them by breeding in and in, like the Bourbons and the Valois; others by downright incest, and other beastly pollutions, like most of the Popes, from the ninth to the fifteenth century.

Then looking lower in society, but higher in morality, we see the men bound to work in the mines, in the weavers' caves, and in the manufactories, contract and transmit to their descendants certain degeneracies of which the *Canut* of Lyons offers one of the types.

That is one view of heredity, but there is another.

Let the over-worked masses of Europe come into our United States of America, and soon their features and forms, their hands in particular, recover the human shape. They soon become middle-sized and quick in the seaboard cities, well-knit in Ohio, Indiana, Michigan, taller in the Alleghanies and Cumberland, heroic but less civilizable in Mississippi, Texas, and the Territories which know no consumption.

In virtue of the same law, the colored race of the Southern States presented, before the emancipation, these no less remarkable differences. Those attached to the family habitation had, before the third generation, the nose higher, the lips thinner, and the hair longer; while those kept in the sugar and cotton fields retained their African type almost unaltered. A physiological truth in Louisiana cannot be falsehood at the antipodes; Dr. Eugene Dupuy has noted the same facts in Mauritius.

But nearer home, who is not struck by the improvement wrought, since the Act of Emancipation, on the features and countenances of the black population of our cities, and particularly of the girls and mothers, by the sole idea that they too can and must improve as a race by education, morality, and progressive selections?

This, too, is heredity. But whereas the former is the irresistible heredity of the beast, and the implacable heredity of the theologian, the latter is the placable, manageable, and progressive heredity of the physiologist—a law instead of the old fatality.

The teaching of the law of heredity is a duty, because it permits, particularly to mothers, to improve the race; that of its unavoidability is a crime, because it opposes fate to progress.

Happily there is little chance that women will be converted to these truly execrable doctrines. Whoever has seen a mother bring her ill-formed child to an institution for idiots, and, with both tears and hope in her eyes, beg for him the resources of a physiological education, will be confident that women will lose their sense of motherhood sooner than their faith in the improbability of their offspring.

From the certainty of the prevalence of this moral sense, and from my personal observation of the feelings of mothers at the bed-side, I confidently conclude that there is no knowledge a young woman would like better to be familiar with than that of counteracting in her child constitutional or hereditary evil tendencies. This she may do to a great degree by recording, with the help of the physiological thermometers and clinical charts, the effects upon the body's temperature, of food, aeration, insolation, exercise, and the results of the nursing, training, education, and general habits. The eye fixed upon the instrument, and the mind upon the deviations of the latter from the norme, a mother can regulate the temperature, that is to say, the vitality of her child, through most of the hereditary and constitutional dangers.

You, madam, were early and exceptionally made aware of the practical identity of heat and life in the infant. Your child, half-suffocated at birth, was restored to life by the filling of her lungs with air which they inspired and expired many times passively as a pair of bellows, before affusions, frictions, (verberations) slaps, movements, and changes of attitude finally succeeded in generating warmth, and in promoting respiration and circulation.

And again, soon after, it became evident that the dear, frail form was losing more heat than her delicate organization could generate; and to retard this loss—which necessarily leads to death so many of the newly born—she was surrounded by an atmosphere of cotton-wool: a sort of transition from the *heavenly* atmosphere of the amnion to the unavoidable intricacies of linen, flannels, lace, ribbons, etc. So that, before most mothers could form an idea of the importance of temperature for their infant,

you had a twofold experience of the means of generating heat by movement, and by the alternate application of heat and cold to the surface, where its production is deficient; and of retarding its loss by isolating media when it escapes faster than it is generated; a pretty rough beginning for your feelings, Madam, but a most eventful and successful debut in a course of motherly thermometry.

For mothers who have not had such early and forcible experience as this, I will take the question from its origin.

The temperature of an infant does not, at once, settle to the human health-point (zero of the mother's thermometer), but passes through a transitory stage, followed by variations—more than oscillations—which represent the difficulties of acclimation to a new atmosphere, to new food, and to new circumstances altogether.

At this period, the norme is displaced; or, to speak more properly, fluctuates between the high temperatures which preside over conception and the life-long norme of the species. A mother can judge of the ill health of her baby by only knowing the standard point of health of these first and most critical days of existence.

Before birth, the temperature of the—not yet—offspring was a trifle higher than that of the mother. At birth, it is like the mother's, $\cdot 25$ and $\cdot 3$ as a rule, with rare deviations, not higher than $1\cdot 5$, not lower than $\cdot 5$. Thence it will fall after the first ablutions and exposures, to rise again, under the influence of good food and care, to $\cdot 25$, where it is generally found the ninth day, and where it remains, at least till the first dentition.

That is the infantile temperature.

Infantile temperature is not only higher than the

norme of grown people, but varies more, oftener, and for causes which do not alter the temperature of the latter.

These exceptions, which at first sight seem to confuse the rule, and obliterate the basis of judgment, serve on the contrary to call the attention to the first wants of the child, which would otherwise remain unsuspected: the thermometer speaks for him.

As a rule, the greater activity of combustion in the infant than in man, shows how easily and fatally he may be affected by inflammation. Exceptionally, the infantile norme may be transferred higher or lower, by an abnormal retention or deperdition of heat, indicating a constitutional affection; whilst, by its frequent and exaggerated fluctuations, infantile temperature incessantly pleads for or against the conditions of aeration, nutrition, comfort, during the struggle for an independent existence.

Again, if the influence of food is almost null in moving the temperature of a man, it raises that of a baby. This action of food amounts in an ordinary infant to a few tenths of a degree, in a starved one to a full degree. Thus, when a mother who is not herself the nurse suspects the food of not being nourishing, or of being scanty, or irregularly given, she can detect these conditions before they have ruined the child, by applying her thermometer. If the index is not moved after taking the nurse's breast, and rises a full degree after a substantial meal obtained elsewhere, it is evident that the child was insufficiently fed, even starved; and the thermometer actually begs salvation for the mute sufferer.

Not only the quality of the food, but its temperature, reacts upon the physiological temperature of the infant;

the latter rising higher after a hot than after a cold meal, even attaining (pathological) sickly degrees, should the food be inadvertently given too hot. A mother who understands the bearing of these facts, will be able to compensate to some extent the abnormal degrees of internal temperature of her baby by that of his food.

Cold baths, affusions, and sleep produce a somewhat similar effect, by bringing to the surface a heat concentrated within; thus remedying the inequalities of temperature and of circulation so frequent in early life.

Truly, even ignorant mothers restore the equilibrium of the vital functions of their ailing children, by an opportune use of food, heat, cold, bathing, sleep, etc.; but how many there are whose child dies because they do not possess that instinctive thermometry; and how much more unerring and efficacious would be this hygienic treatment, if it were intelligently applied under the guidance of thermometrical reckoning.

Besides, physicians cannot be summoned at the cradle every minute; they cannot even be there often enough to establish the infantile and individual norme by which to judge of subsequent illness. Clearly this is, and must remain, the business of a mother. If she do not do it, nobody can or will; by doing it, she acquires the highest capacity of her profession, which profession she soon loves as an art; and when the extreme temperatures admonish her to call a physician, she can spread before him a thermometrical record, which throws on the case a light for which he, more than she, must be thankful.

But this is not all.

The body's temperature is correlated in so many ways

to the circulation and respiration, that any concordance or discordance between these three—in many respects factors of life—express relations important to life itself.

With scarcely any exception, in adults and in health, the circulation and respiration deviate more from their acknowledged average, than does the temperature from its norme. In sickness, this is still more the case. In healthy children, the infantile and puerile circulation and respiration are farther from the adult average, and more erratic than the temperature; but in sickness it is yet more so. These are some of the reasons which made me put off till now what it is necessary to mothers to know and to record, about the pulse and breathings.

At birth, the previous (fœtal) circulation becomes accelerated by the stimulation of new circumstances. If the pulse comes down in sleep to 120 beats in a minute, and even lower, for a day or two, by the hardships of acclimation, and the want of milk from the mother's breast, it soon rises again by good nourishment to 130–150.

At the same time, the infantile respiration, more exaggerated and more variable in proportion to its normal range than the pulse, may give 40–60 inspirations in a minute, and may even pass in a short time from 30–80 without appreciable cause. Let us note also that superficial or imperfect breathing is supplemented as in grown people by yawning, and as in hysterics by crying.

The relations of the circulation and respiration during the first year and a half, or so, stand 140–160 pulsations against 50–60 breathings in a high state of vitality;

more commonly 120 pulsations to 35 breathings, respectively reduced to 104 and 26 during actual suckling, and to 100 and 24 during sleep.

From two to seven years, the puerile norme or habit of these functions, by which to judge of sickness, will be, pulse 100, respiration 24, subject to great variations—in which the temperature will be involved—caused by dentition, defects of nutrition, hasty growth, constitutional (idiosyncrasies) tendencies, tuberculosis, rickets, etc.

As a mother must be fully conversant with the differences between the adult norme given above, and the normes of the successive ages (climactic) as the children grow; so that she could appreciate in degrees the anomalies brought on by disease, I will establish here a

SYNOPSIS

OF THE CONCORDANCE OF THE THREE GREAT VITAL SIGNS
AT DIFFERENT JUVENILE AGES.

AGE.	TEMPERATURE.	PULSE-BEATS.	BREATHINGS
<i>Infantile at birth.</i>	1- .5	120-150	40-60
“ 2d-3d day	0- .2		
“ 7th day	.2- .6		
“ 1st month	.5		
“ 1st year	.25	105-130	30-40
<i>Puerile</i>3d year	.4	95-105	23-26
“7th year	.21	80- 90	22
<i>Pubescent</i> .15th year	.31	75- 85	20
<i>Adult</i>21st year	0	70- 75	16-18

Any notable deviation from these averages has a meaning. Is the deviation constant, it represents a constitutional anomaly; transitory, occasional, or inter-

mittent, it shows a predisposition to, or an actual disease; comprising the three functions, it shows a general trouble or anomaly of the system; affecting only one of the three, it points out the origin of the disorder in that direction. But to find these simple indications, each observation has to be written on the clinical chart and compared with the averages of the above synopsis, as well as their daily and weekly averages.

By these comparisons, you know not only if your child is sick, even when he appears well by the common standard; and if he is well, even when he appears sick according to the same scale; but you know also where his sickness must be located, if it is local.

This leaves only to be solved the question of the relative value, or rather *signification* of the signs of health or disease furnished by the three great vital functions.

The reliability of these functions as signs of health and disease, is in the inverse ratio of their capacity of deviation from their norme. Thus, the signs furnished by the pulse are not entirely reliable in the young; when of short duration, they may have been provoked by passional or digestive troubles; when persistent and growing worse they herald eruptive, cerebral, or abdominal fevers. Moreover, their signification needs to be authenticated by that of the temperature.

The respiration is still more changeable in children. It may pass at once from 40-80 breathings in a minute, under the influence of a transitory cause, and may be thus without danger; whereas the same rate of breathing, when protracted, is incompatible with life.

But the variations of the body's temperature from its

norme, though numerically smaller than those of the circulation and respiration, have more import, and express more correctly the (status) condition of the patient ; let this be remembered.

I have thus strongly insisted upon the (climactic) normes, and the possible individual deviations therefrom of temperature, circulation, and respiration, in order to give a solid basis to the judgment of a mother. When she wishes to know the gravity of a disease in her child, she has only to compare the magnitude of the fluctuations of these functions with their pre-ascertained individual or climactic normes.

These fluctuations being more erratic, and induced by slighter provocations in children than in adults, they are altogether less momentous by their figures ; and yet they need more vigilance on account of their versatility.

Fluctuations of temperature move, of course, above or below the norme. Those that move above are by far less dangerous than those which move below, particularly in children, who lose very soon the power of reaction (of generating their own heat). Even in adults, one degree below the line of health ($\overline{1}$ on the chart) absolutely represents more danger than two-and-a-half above ($\underline{2.5}$) ; and two below ($\overline{2}$) more than four above ($\underline{4}$) ; and so on, till, through longer or shorter roads, the fatal point is equally met.

The danger of high temperatures is not only absolute, that is to say, in relation to their arithmetical distance from the norme, but also proportionate to the time of their occurrence, to the length of their duration, and to their place in the series they belong to. Thus a given

temperature has not the same import in the morning and in the evening, at the beginning of a disease, and in subsequent weeks, months, years; when the malady is short or protracted, acute or chronic, intermittent, continuing, or progressive.

The danger of low temperatures lies, first, in their absolute degree, second, in their continuity, and third, in their descending progression. Thus, every circumstance being equal, a child could sooner afford to lose four degrees ($\underline{4}$) during two days, or be minus one degree and a half ($\underline{1.5}$) during half a day, than another child to lose one degree and a quarter ($\underline{1.25}$), or to remain during several weeks four-tenths of a degree below the norme ($\underline{.4}$). For, though the short and excessive disorder of uction may have killed, if it has not, it leaves hardly any trace; but the low and slow disorder, though faintly noticeable at first, could hardly fail to prepare the way for some constitutional affection, or to invalidism worse than death.

Experience will soon give a concrete form to these generalizations. In a few months, the thermometric capacity of the mother will be tested by teething and infantile diarrhoeas. In both, she will find the temperature higher at first, and lower as the disease lasts; opposite temperatures, which not only indicate the degree of irritation in one period, and the degree of debility in the other; but which give also the measure of the treatments needed in both circumstances; cooling and demulcent in the former, tonic and supporting in the latter, etc.

When she has followed the complicated changes (peripeties) of these first thermometric dramas, in which a dear life is all the time at stake, a mother's wits must have

become sharpened in the art of grappling with the premonitory and actual symptoms of the diseases incidental to infancy and childhood.

For the sake of clearness and shortness, I will group these affections into those which are communicable or catching, and those which creep in by hereditary or accidental influences, and become the starting-point of constitutional affections or defects.

To the first class belong measles, scarlatina, diphtheria, mumps, etc. Considering how important it is for the possible patient, and for others moving about him, to be promptly apprised of the presence of such disease in the family circle, either you, Madam, or a physician must be continually watching its earliest (prodromes) first signs.

What are now considered as the first signs of the contagious affections of children are the secondary symptoms. If you look for them on the face, in the throat, etc., you would be sadly mistaken, since measles and some of its kindred affections may be contagious before the appearance of the eruption, and, moreover, the eruption may never appear. Whereas, if you know how to interrogate the temperature, you will find it an earlier and surer sign; indeed, the only promonitory sign.

In diphtheria the temperature will detect the disease when nobody thinks yet of looking at the throat; in epidemics of scarlatina it admonishes in advance of all the other symptoms; and when it is (anomalous) without eruption, it is detected only by the height of the temperature; otherwise, the child, uncared for, may die; and, let at large, may contribute to the spread of the disease.

[This spread takes place in virtue of a natural operation now usually called *incubation*, and by T. Willis *fermentation*; expressions which represent two wide-apart theories of medicine, but easily understood by their analogy, the former with hatching, the latter with brewing.]

In scarlatina, with an average incubation of five days, the maximum of fever temperature, 4, precedes the eruption by twenty-four hours. In measles, with an average incubation of fourteen days, the fever-temperature, 3.5, begins four or five days in advance of the rash. In small-pox, with an incubation of fourteen days, the fever-temperature, reaching sometimes 4.2, precedes by at least two days the appearance of the pustules. In whooping-cough, the first sign of pulmonary complication is the progressive heightening of the temperature, etc. To conclude; in these diseases and kindred affections, the warning of the temperature precedes all others, at least by a day, often by several; and permits a mother to use preventive and isolating measures with a reasonable chance of success.

The same advantage results—be it said incidentally—from the use of the thermometer in vaccination. After the operation, the temperature falls at first, then steadily rises above the norme from the fourth to the fifth day, up to the formation of the pustule, which arrives the eighth day. This thermometric law of the incubation of the vaccine virus authorizes to repeat revaccinations, when the small-pox is raging, as often, and as soon as the febrile period is arrived at, without the initial fall, and the subsequent elevation of temperature.

A mother cannot foresee nor prevent all the accidental

diseases of childhood, but she can, to a great extent, those which are incidental to growth; be they attributable to hereditary influences, to bad blood, habits, food, or habitation, to unsuitable climate, excessive studies or exercises, to moral compression or relaxation, etc. This class is composed less of diseases proper, than of constitutional affections, incidental to growth in deleterious conditions.

Growth, like birth, and like the initial acclimatization to our universe, is a kind of sickly state which requires a constant watching, with a good understanding of the laws of evolution from infancy to manhood.

Though children may be said to grow all the time, it is more correct, and fraught with more fertile lessons, to consider growth as a function, which, like all the other functions, is subject to intermittences and oscillations. A child is taller in the morning than in the evening; changes which may be said to be only functional, but in which teachers and parents must see a warning against protracted standings or sittings.

There are also for children vernal seasons to grow, and hibernal ones to consolidate the tissues; besides the climactic epochs already alluded to as the turning-points of growth, in which the child takes new or stronger starts towards superiority or degeneracy, dependent upon the proportion of food, aeration, and other elements of the production of warmth to the consumption of the same in study, exercises, moral contentions, etc.

These conditions of the growth-period are entirely under the control of the mother; yet she has no instructions to be guided by in that matter; and she is not likely to find any help through the intricacies of that

period. Too few physicians prescribe in view of preventing constitutional affections; because probably they are not called to do it, or would be ridiculed if they volunteered to do it. Servants and attendants conceal from the mother what she ought to know; and teachers overdo what they ought to do.

If she does not take care, the gymnast will make her son a bully; the boatswain will develop in his model chest an aneurism; the scholar will let him see the world only through alphabets; a doctor will feed him upon some plan which will develop beautiful parasites on his skin; when another will diet her girl till she becomes an old woman at eighteen, never likely to see a trace of her womanhood any more. Who can put a stop to these indignities and insanities, but a properly informed mother?

But is that all? No. Teachers—I do not mean only the small fry—are too full of their *subject-matter*, and too empty of human knowledge, to see how often they graduate their pupils for the next world.

When writing this in strict conformity with educational feats of which I possess the particulars, but not without the apprehension of having used too strong language, I read the sad news of the death of one of these martyrs of schooling even unto death. It was only a prince, an anachronism withal, a pseudo-Guise. If his mother could have holden the thermometer during his scientific stuffing, she could have marked the precise point at which his ustion began to be in excess of the supply of his materials of combustion, and his living flame would not have flickered away. Let us fervently hope that his fate will be more useful as a lesson, than his life could have been in the garb of a Pretender.

But who is responsible for the fate of these other little pretenders to the crowns of our Universities? of that of Paris, for instance, to speak of what I knew. There, children are mentally and physically wrecked during their forced training for a *prix d'honneur*! Some die on the spot of acute meningitis or softening of the brain, some become imbecile; the majority of them, rendered forever incapable of another mental effort, are hardly adequate to the filling of some mean official station "*bons à peine pour faire de plats sous-prefects*." In short, every would-be helper of a mother in the task of raising her children seems to be a betrayer, as if to teach her that she alone must brood her own covey.

The greatest danger comes when the education is almost finished. Yet another mental effort, a few months more of application to abstruse matters, and the scholars will be safely landed respectively, and in their womanhood and virility; but no! The foe has slipped in between the pages of books, or when study had prevented eating, or during the long reclining hours of meditation. It has many names—phthisis, meningitis, etc., but only one face at first, which a mother cannot mistake at a glance.

"Ah! C'est toi vieille infame."

(Th. Gauthier, in *Comédie de la Mort*.)

Yes! it is. The child has grown in the class-room, or factory, like a plant under cover. No chlorophyll for the plant, few red globules in the blood, and no combustible material supplied when combustion is doubly stimulated by the demands of growth, and of bodily or mental exertions.

Hence came for the child the necessity of keeping up

the intellectual fire with his own substance. I called, after Trousseau, *Egophagism* the operation by which starved patients live upon their own substance; must I now call *egopyrism* the homicidal operation by which human ution is kept up without a supply of fuel equivalent to the demand? But common people have long ago found the proper name of that self-combustion, *consumption*, not only of the lungs, but of the brain and other vital organs. It is, like all the exaggerated utions, written on the thermometer. That is where a mother must read—not its confirmation, which will soon be imprinted upon the features, an indelible shadow of the destroyer—but its warnings; let us read these together.

When a child is confined to school-rooms, crowded dormitories, or manufactories, being meanwhile underfed and overworked, his mother must, at every opportunity, study his temperature. First with the hand, to feel the heat, dryness, tension, and other modifications of the skin, which indicate a waste, or a want of vitality, and to compare the temperature of different parts with each other.

If this hand-survey is not satisfactory, she applies her thermometers.

(Where children are gathered for their education, it will soon be considered indispensable to take their temperature, local and general, individual and average, by groups of training, and all together, at every important change of studies, of food, of clothing, etc. With the present dearth of such standard measures, the mother is expected to have, previously to sending her child to school, taken the normes of both temperatures of the head and armpit.)

Then the mother applies the surface-thermometer to

various parts of the head, either holden for a few minutes with the hand, or kept in place by a belt during protracted studies. It shows the head hotter than it was at home; or warmer, from a fraction to several degrees, after studying than after rest or recreation; or gradually so, after exercise, from morning to night; or more heated on one side than on the other. In this latter respect, she will generally find the left side the warmer, for this reason:

The brains work, like all our double organs, more on one side than the other. In the great majority of men, the left lobes perform more intellectual work than the right, as the right hand performs more automatic or skilled labor than the left; the same attribution of function exists for the ear, the eye, etc. In case of accidents, or of apoplexy, paralysis, aphasia, anæsthesia, etc., which oftener strike the working side, the lazy side comes *volens volens* to the rescue, and sometimes works as if it had done nothing else.

This explanation is given here, so that a mother need not be unduly alarmed at finding a difference of a few tenths of a degree between the two temples. This fraction is (physiological) healthy, since it represents the difference of heat during action, and during inaction; but differences of several degrees between the two sides of the head—as found by Brown-Sequard—represent (pathological) sickly states, which call for motherly interference in the would-be education.

In the same conditions, the fever-thermometer is applied to see what are the effects of the training upon the general ution. If the school is not fit for the subject the mother will find the thermometrical admonitions not very dissimilar to the following ones:

If the morning temperature is two to five-tenths of a degree below the norm ($\bar{.2}$ – $\bar{.5}$) the child is ill-fed for some cause, or under a depressing influence, like (nostalgia) home-sickness; if it is generally low, and do not rise $\bar{.1}$ – $\bar{.25}$ after meals, his food is worthless; if it is almost normal, with hardly any healthy undulations, the child needs more exercise and general stimulation; if it is normal in the morning, and rises $\bar{.25}$ – $\bar{1}$ after a mental effort in the middle of the day, the child is not—at least for the present—fit for a student's life. If the morning temperature is $\bar{.5}$ – $\bar{1}$, progressively rising $\bar{1}$ – $\bar{3}$ towards evening, hurry him away, quickly, and far away, to some place and occupation where he will have enough of oxygen, pure air, food, and exercise, to live, to grow, to work, and to spare.

That is the judgment founded upon this law :

The body is an organism, whose component parts evolve forces available for organic or mechanical labor. The fuel of this force is oxygen, which, presented in acceptable form, and once stored in the body, becomes a potential force, convertible during movement into an active force; the two being, of course, but one and the same force, alternately in puissance, a reserve, and in action.

The supply of this force comes mainly from the vegetable life, as the plant lives mainly upon the products of animal oxidation. When, during six months, Dr. H. Bennet breathes the emanations of the sea and the perfumer's gardens of the Mediterranean shores, he stores in his consumptive frame enough of potential forces to last him, and be transformed into acting forces, during his next six months of medical life in London. Doing this, the eminent physician does not copy any prescription from the

pharmacopeia, but applies to his own case a discovery of the chemistry of life.

My advice to you, Madam, for the management of your child, proceeds from the same principle; so also my practice of refusing to see some of my young patients at home, during the summer, but of visiting them in our beautiful Central Park, whose vegetation elaborates, in assimilable form, all the oxygen they need to counteract the action of the carbon they inhale in the brick-furnaces of Mr. Phalaris, Esq., and Landlord.

This principle has been my guide when I spoke of the management of acute and contagious diseases, as it is now, when I insist upon the possibility for a mother of preventing or palliating constitutional affections in her growing children.

This principle is so important that, sooner than to let it be suspected that it is improvised in order to advocate the introduction of the thermometer in every family, I will trace its enunciation to its originators. These were such as Currie, J. Davy, and Beddoes, men like their cotemporaries, Cabanis and Bichat, philosophers in physic, and physicists in philosophy.

Here are Beddoes' own expressions: "What would save multitudes (particularly of children, who perish because neither parents, nor medical men, have any proper conception of the effect of temperature on their disorder) is an apparatus for applying heat or cold at pleasure to the whole body, or to any part of it."—(*Contribution to Physical and Medical Knowledge*, p. 332, Bristol, 1779.)

The principle of modifying internal sickly temperatures by external ones, mathematically dosed, like remedies, is here implicitly expressed. But then the many

apparatuses recently suggested for the application of heat or cold to the sick body were out of question, as was the possibility for mothers to be skilled in the use of the thermometer, and to become the most trusty and intelligent of the medical assistants.

Besides rendering the management of the sick mathematical, and giving to the mother a superiority and a dignity in home affairs, to which she would never pretend as long as she reared her family by the dark light of instinct alone—besides this, thermometry will detect, in children, soldiers, seamen, and artisans, the commencement of diseases which they do not suspect in themselves, and the simulation of others (malingerers) to shirk their duties. It will enlighten every one upon his actual fitness to undertake travels or extra work, as well as upon his constitutional inability to supply the continuous expenditure of vitality demanded by certain professions. It will, moreover, warn the unwary of the necessity of having recourse to a physician, or of the propriety of managing their own slight deviations from the standard of health according to the indications of their thermometer: except in extreme sickness, and in infancy, every one may be his own thermometrician.

I began by exhorting every physician to teach thermometry to every mother; and I conclude by exhorting every mother to teach it to all her children, as the A, B, C, of the reading and future understanding of their own health.

To you, Madam, and to the other women who have followed me through this new field of thought, for the love they bear to their children, and in the hope that this method of nursing will enable them to bring up their

families better and more understandingly, I ought not to say a word more upon these abstruse matters than is necessary for their clear comprehension; and I will recapitulate my idea of *Motherly Thermometry* in the most compressed and simple form.

Practically, heat is life, a normal heat is health, an abnormal heat is disease.

The physiological thermometer takes its standpoint at zero, that is health; and its deviations above or below zero show you in figures the quantity of heat or life escaping or escaped, not generated or unduly retained; that is the measure of the gravity of the disease.

In disease the escape of heat follows certain progressions and forms of alteration which indicate their fortunate or fatal issue.

Infantile and puerile temperatures are more variable than adult ones, and cannot therefore have the same meaning; they need more frequent watching.

Besides, infantile and puerile temperatures are much oftener affected by hereditary and constitutional causes.

Hereditary, or constitutional, or chronic diseases do not affect the temperature like acute diseases. In the latter, the height and the fluctuations of the action indicate its danger; in constitutional affections, the continuity and the progression of the action foretell its issue; unless when, at a late stage, it assumes the acute type and march.

Abnormal temperatures—be they excessive, as in acute diseases, or low and slow, as in chronic or constitutional degenerations—are favorably affected by external temperatures.

This action of external temperatures on the temperature

of the sick is measurable on the stem of the physiological thermometer.

This medication by temperatures is called positive, or mathematical, because its observations—successes or failures—are written in figures which a child can read, which no adult of ordinary intelligence can misunderstand.

Both, this standard measure of health, and of disease, and this dosing of a new health to the sick through temperatures, have a common name: *Human Thermometry*.

Before this, did women have any standard to measure the health and sickness of their children? Or any truth, principle, formula, body of opinions, or set doctrine, by which they could—with the impulse of their motherly love—allay or prevent diseases in their families?

Let me tell you, Madam, how these things were going on not very long ago, as they were a long while ago, and as they are said to go on even to-day.

Though woman never received any formal education in medical, hygienic, and nursing matters at large, yet in all times she heard muttered some mysterious words about religious powers ruling these matters. It was *Æsculapius*, *Diana*, *Chyron*, *Lucina*, etc., till being unable through discredit—see *Oribasus'* letter to *Julianus*—to pay expenses at *Delphi*, *Epidaurus*, *Ephesus*, etc., they were superseded by other supernatural powers. So that when the modern woman has some friends in pain or distress, she raises her supplicating hand towards *Olympus* no more, but to the worthies who received their diplomas from the *Vatican*.

For herself, as soon as the modern uneducated woman is startled by the first quickening of her child, equally ignorant, alarmed, delighted, and bewildered, she feels that

she must appeal to somebody who knows, and who could not betray her trust. But social conventionalities forbid her to reveal her blessing. It is then, among the complex anxieties of the mind and of the womb, or later, during the superhuman efforts at delivery, that she devotes her expected baby to the Virgin Mary, or to some minor saint whose heavenly patronage averts specific diseases or bestows special talents. Later yet, to cure her infant, she would burn candles to some altar; and to save him from the danger of an epidemic, she would have expensive masses* officiated; whilst, against the eventuality of general or chronic affections, ills, or evils, she had, from the first, hung to his neck an amulet, on which the anagram of the Jesuits has taken the place of the image of Hercules: So much for *progress*.

That is all these women have been stealthily taught, know, and believe about the management of the health of their families. For this who is to blame—the Bonze who played the doctor, or the doctor who did nothing?

And what is, on the other hand, the mental position of the women who, thoroughly educated otherwise, have not been taught the prescriptions of Theurgic Medicine?

* Theurgic Medicine has gone a good deal further and lower, when practised by men than by women. At Gentilly a dog's mass was celebrated on each anniversary of St. Hubert's day. The chapel was decked with flowers, the dogs of the chateau introduced, according to the nobility ascribed to their respective races; the most distinguished were placed on the front row, before the picture of St. Hubert, which formed the altar-piece. The Almoner of the chateau then officiated the mass; read the litany of the day; pronounced a panegyric on the patron of the dogs and hunters, as specifics against the accidents, diseases, and hydrophobia, to which dogs are particularly liable.

Seeing everything around them co-ordinated according to certain laws of physics, mathematics, chemistry, etc., they wonder how it happens that they alone, in their professional capacity of breeders of men, have no rule to abide by, and no possibility of acting in an emergency with any likelihood of obtaining an accurate result.

These women know very well that, in their department of labor, men take good care to secure for themselves the most appropriate education and effective instruments, in order to obtain the most satisfactory products. And, reflecting upon their own present status in the field of labor, and upon the incommensurable value of the products of their loins and vigils, women cannot suppress their apprehensions, or disgust, at being obliged to raise our children, in health, or in disease, without having been taught how to do it.

Is not this the principal reason why—under the depressing feeling of their ignorance and incompetency—too many women escape maternity, even at the known risk of shame or death, sooner than to undertake what they know nothing about? No crime brings more surely its own punishment, dishonor, crippleness, and that peculiar sadness which imprints itself like a judgment on the once loveliest features. Who would say that women alone deserve reprobation for this, and that those are exempt of blame who could have taught them their duty, and have not?

Evidently there is only one question at issue: who must teach women in the art of rearing and nursing children? The bonze, the quack, or the physician? I have tried to do it.

To you, Madam, and to the other women who

have read these pages, Human Thermometry is now open.

If, at times, far away from a medical adviser, you are called to the bedside, do not forget your thermometer; and when you shall have succeeded, with its help, in restoring a normal temperature, remember that we too have our saints, can recite our litanies of gratitude, and will thank—

Sanctorius, who invented the first thermometer to measure the loss of bodily heat, and the first scale to weigh the loss of bodily substance in disease;

De Haen, who first taught and practised thermometry in hospital clinics;

Currie and Beddoes, who proposed the application and dosage of external temperatures as remedies;

Brechet, who found the normal temperature of man, the NORME, without which the degree and danger of sickly temperatures could not be mathematically measured;

Henri Roger, whose observations on the temperature of children in their various diseases have preceded all others, and have not yet been surpassed in interest and practical value;

Wunderlich, who, upon the indications of Roger, that “sickly temperatures had their laws,” discovered some of these laws, out of one million of thermometric observations, in proof that patience too is genius.

I could name more of these saints of the scientific calendar, but none by a feminine name.

Is it to say that women have abandoned the fine art of nursing at the very time it was becoming, with the help of human thermometry, a positive science? No, Madam.

The heroism of the modern nurses, typified in Miss Nightingale, and the high grade of medical attainment of many female students, exemplified by one of your sisters, are sure guarantees that the women of our days are ready to accept the doctrine embodied in Fénelon's *Education des Filles*, that nursing is the most essential, and noblest part of female education. It is this part which I have, here, explained to you with the assistance of our modern means of studying nature. Motherly thermometry is but one of the foundation-stones of the school of the future for women; and the future, you know, commences now.

E. SEGUIN,

17 East 21st Street.

New York, Oct., 1872.

P. S. As physicians may be called to pass an opinion on this little work, I beseech them:

To remember that, if it is beneath their own knowledge of thermometry, it is not that of mothers;

To patiently explain, when asked, what I have left incomplete or obscure;

To view the work in its *ensemble* entirely as an effort to enlighten those most interested in the subject;

To lighten their own responsibility as practitioners, and to render their success more easy, by instructing mothers and nurses in the art of giving indubitable reports;

To raise physic to a level with the other labors of the positive school; and to make it, not only an art and a science, but a philosophy.